

REMARKS

This is intended as a full and complete response to the Office Action dated October 21, 2003, having a shortened statutory period for response set to expire on January 21, 2004. Please reconsider the claims pending in the application for reasons discussed below.

Claims 8, 10-19, 21, 24-30, and 32-36 remain pending in the application and are shown above. Claims 8, 10-19, 21, 24-30, and 32-36 are rejected. Reconsideration of the rejected claims is requested for reasons presented below.

Applicants have amended claims 12 and 33 and the specification to correct the formulae for magnesium hydroxide ($\text{Mg}(\text{OH})_2$) and calcium hydroxide ($\text{Ca}(\text{OH})_2$). Applicants submit that the changes made herein do not introduce new matter.

Claims 8, 10-19, 21, 24-30, and 32-36 stand rejected under 35 U.S.C § 103(a) as being unpatentable over *Homma, et al.* (U.S. Patent No. 6,043,155), in view of WO 00/49647. The Examiner states that in view of WO 00/49647, it would have been obvious to substitute a conventional inexpensive abrasive such as silicon dioxide, aluminum oxide, zirconium oxide, or titanium oxide for the ceria abrasive in the method of *Homma, et al.* Applicants respectfully traverse the rejection.

Homma, et al. describes polishing an organic insulating film of a silicon compound containing 1% or more of organic components in the film with a slurry containing cerium oxide. *Homma, et al.* does not teach or suggest polishing organic insulating films of a silicon compound containing 1% or more of organic components with slurries containing abrasives other than cerium oxide. WO 00/49647 describes polishing a low dielectric constant polymer layer with a slurry containing a metal oxide such as alumina, silica, germania, ceria, or titania as an abrasive. WO 00/49647 provides parylenes, fluoro-polymers, polytetrafluoroethylene, aerogels, micro-porous polymers, and polyaryleneethers as examples of low dielectric constant polymers that may be polished with the slurries provided therein. WO 00/49647 does not teach or suggest polishing low dielectric constant polymers that contain silicon. In particular, WO 00/49647 does not teach or suggest polishing organosilicate layers with the slurries provided therein. Applicants submit that the combination of *Homma, et al.* and WO

00/49647 does not provide a method of polishing an organosilicate layer with a slurry including an abrasive material selected from the group consisting of silica (SiO_2), aluminum oxide (Al_2O_3), zirconium oxide (ZrO_2), titanium oxide (TiO_2), and combinations thereof.

Therefore, *Homma, et al.* in view of WO 00/49647 does not teach, show, or suggest a method for planarizing an organosilicate layer, comprising positioning a substrate having an organosilicate layer thereon in a polishing system, providing a slurry including an abrasive material selected from the group consisting of silica (SiO_2), aluminum oxide (Al_2O_3), zirconium oxide (ZrO_2), titanium oxide (TiO_2), and combinations thereof dispersed in a solvent to the polishing system, wherein the slurry has a pH greater than about 9.0, and polishing the organosilicate layer using the slurry, as recited in claim 8. Applicants respectfully request withdrawal of the rejection of claim 8, and of claims 10-18, which depend thereon.

Applicants further submit that *Homma, et al.* in view of WO 00/49647 does not describe or suggest polishing an organosilicate layer with a slurry containing an abrasive material selected from the group consisting of silica (SiO_2), aluminum oxide (Al_2O_3), zirconium oxide (ZrO_2), titanium oxide (TiO_2), and combinations thereof and a source of hydroxyl ions selected from the group consisting of potassium hydroxide (KOH), ammonium hydroxide (NH_4OH), sodium hydroxide (NaOH), calcium hydroxide ($\text{Ca}(\text{OH})_2$), magnesium hydroxide ($\text{Mg}(\text{OH})_2$), as described in claim 12. *Homma, et al.* describes polishing SiO_2 with a slurry containing silica and KOH and polishing an organic insulating film with a slurry containing cerium oxide and a pH adjusting agent such as ammonia, waterholding hydrazine or an amine containing neither Na nor K, or an acid (column 1, lines 21-26). *Homma, et al.* provides no suggestion or motivation to include potassium hydroxide (KOH), ammonium hydroxide (NH_4OH), sodium hydroxide (NaOH), calcium hydroxide ($\text{Ca}(\text{OH})_2$), magnesium hydroxide ($\text{Mg}(\text{OH})_2$) in a slurry for polishing an organosilicate layer. WO 00/49647 describes references that provide slurries for polishing tungsten that include KOH or NH_4OH as etchants (p. 2, lines 6-14). WO 00/49647 does not teach or suggest adjusting the pH of a slurry for polishing an organic film by adding potassium hydroxide (KOH), ammonium hydroxide (NH_4OH), sodium hydroxide (NaOH), calcium hydroxide ($\text{Ca}(\text{OH})_2$), magnesium hydroxide

(Mg(OH)₂) to the slurry. Applicants respectfully request withdrawal of the rejection of claim 12.

Applicants submit that *Homma, et al.* in view of WO 00/49647 does not describe or suggest polishing an organosilicate layer with a slurry containing an abrasive material selected from the group consisting of silica (SiO₂), aluminum oxide (Al₂O₃), zirconium oxide (ZrO₂), titanium oxide (TiO₂), and combinations thereof and KOH, as described in claim 19. Applicants submit that *Homma, et al.* teaches away from using KOH as a pH adjusting agent, as *Homma, et al.* describes pH adjusting agents such as ammonia, waterholding hydrazine or an amine containing neither Na nor K (column 4, lines 35-38). Furthermore, as discussed above, *Homma, et al.* does not teach or suggest polishing an organosilicate layer with a slurry including an abrasive material selected from the group consisting of silica (SiO₂), aluminum oxide (Al₂O₃), zirconium oxide (ZrO₂), titanium oxide (TiO₂), and combinations thereof. WO 00/49647 describes references that provide slurries for polishing tungsten that include KOH, but WO 00/49647 does not teach or suggest adding KOH to the slurries described therein for polishing low dielectric constant polymer films. Furthermore, as discussed above, WO 00/49647 does not teach or suggest polishing organosilicate layers using the slurries described therein. Thus, *Homma, et al.* in view of WO 00/49647 does not teach, show, or suggest a method for fabricating a device, comprising providing a substrate having conductive features formed thereon with an organosilicate layer deposited between and on top of the conductive features, positioning the substrate in a polishing system, providing a slurry including an abrasive material selected from the group consisting of silica (SiO₂), aluminum oxide (Al₂O₃), zirconium oxide (ZrO₂), titanium oxide (TiO₂), and combinations thereof dispersed in a solvent and potassium hydroxide (KOH) to the polishing system, wherein the slurry has a pH greater than about 9, and polishing the organosilicate layer using the slurry, as recited in claim 19. Applicants respectfully request withdrawal of the rejection of claim 19, and of claims 21 and 24-29, which depend thereon.

Applicants submit that claim 30 is patentable for the reasons discussed above with respect to claim 8, as claim 30 includes providing a slurry including an abrasive material selected from the group consisting of silica (SiO₂), aluminum oxide (Al₂O₃), zirconium oxide (ZrO₂), titanium oxide (TiO₂), and combinations thereof. *Homma, et al.*

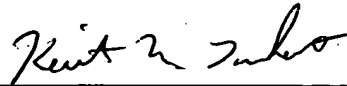
in view of WO 00/49647 does not teach or suggest a method for planarizing an organosilicate layer, comprising positioning a substrate having an organosilicate layer thereon in a polishing system, providing a slurry including an abrasive material selected from the group consisting of silica (SiO_2), aluminum oxide (Al_2O_3), zirconium oxide (ZrO_2), titanium oxide (TiO_2), and combinations thereof having an average particle size greater than about 35 nm and dispersed in a solvent to the polishing system, wherein the slurry has a pH greater than about 9.0 and the concentration of the abrasive material in the slurry is within a range of about 10% by weight to about 60% by weight, and polishing the organosilicate layer using the slurry, as recited in claim 30. Applicants respectfully request withdrawal of the rejection of claim 30, and of claims 32-36, which depend thereon.

Applicants further submit that claim 33 is patentable for the reasons discussed above with respect to claim 12, as claim 33 recites a source of hydroxyl ions selected from the group consisting of potassium hydroxide (KOH), ammonium hydroxide (NH_4OH), sodium hydroxide (NaOH), calcium hydroxide ($\text{Ca}(\text{OH})_2$), magnesium hydroxide ($\text{Mg}(\text{OH})_2$), and combinations thereof. Applicants respectfully request withdrawal of the rejection of claim 33.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.

Having addressed all issues set out in the office action, Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



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